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**IN THE CLAIMS:**

1. (Currently amended) Apparatus for leak detection comprising:
  - a first sealable chamber configured to receive a test piece containing a trace gas;
  - a second sealable chamber;
  - a first valve coupled between the first and second chambers;
  - a leak detector having a test port, the leak detector comprising an ion pump;
  - a trace gas permeable member coupled between the second chamber and the test port of the leak detector, the trace gas permeable member allowing the trace gas to pass and blocking other gases, liquids and particles;
  - a vacuum pump having an inlet;
  - a second valve coupled between the second chamber and the inlet of the vacuum pump; and
  - a controller to control the permeable member at a high trace gas permeability at relatively high pressures a first pressure of about 100 millibar in the second chamber and to control the permeable member at a low trace gas permeability at a second pressure by relatively low pressures in the second chamber, which is lower than said first pressure and is suitable for operation of said leak detector.
2. (Previously presented) Apparatus as defined in claim 1, wherein the permeable member is permeable to helium.
3. (Previously presented) Apparatus as defined in claim 1, wherein the permeable member comprises a quartz member, the apparatus further comprising a heating element in thermal contact with the quartz member, wherein the controller is configured to control the heating element.
4. (Currently amended) Apparatus for leak detection comprising:
  - a first sealable chamber configured to receive a test piece containing a trace gas;
  - a second sealable chamber;

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a first valve coupled between the first and second chambers;  
a leak detector including a test port and a vacuum pump;  
a second valve coupled between the second chamber and the test port of the leak detector;  
a trace gas permeable member coupled in parallel with the second valve between the second chamber and the test port of the leak detector, the trace gas permeable member allowing the trace gas to pass and blocking other gases, liquids and particles; and  
a controller to control the permeable member at a high trace gas permeability at ~~relatively high pressures~~ a first pressure of about 100 millibar in the second chamber and to control the permeable member at a low trace gas permeability at a second pressure by relatively low pressures in the second chamber, which is lower than said first pressure and is suitable for operation of said leak detector.

5. (Previously presented) Apparatus as defined in claim 4, wherein the second valve is closed at relatively high pressures in the second chamber and wherein the second valve is open at relatively low pressures in the second chamber.

6. (Previously presented) Apparatus as defined in claim 4, wherein the permeable member comprises a quartz member, the apparatus further comprising a heating element in thermal contact with the quartz member, wherein the controller is configured to control the heating element.

7. Canceled.

8. (Previously presented) Apparatus as defined in claim 4, wherein the permeable member is permeable to helium.

9. (Currently amended) A method for leak detection, comprising:  
providing a first sealable chamber, a second sealable chamber and a first valve coupled between the first and second chambers;

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placing a test piece containing a trace gas in the first chamber with the first valve closed; vacuum pumping the second chamber with the first valve closed; opening the first valve, wherein gas in the first chamber expands into the second chamber;

providing a trace gas permeable member coupled to the second chamber, the trace gas permeable member allowing the trace gas to pass and blocking other gases, liquids and particles; and

detecting a leak in the test piece by sensing the trace gas that passed through the permeable member with an ion pump and monitoring ion pump current;

vacuum pumping the second chamber with the first valve open, and sensing the trace gas pumped from the second chamber to provide detection of small leaks; and

controlling the permeable member at a high trace gas permeability at relatively high pressures a first pressure of about 100 millibar in the second chamber and controlling the permeable member at a low trace gas permeability at relatively low pressures a second pressure in the second chamber, which is lower than said first pressure and is suitable for operation of said leak detector.

10. Canceled.

11. Canceled.

12. (Previously presented) The method as defined in claim 9, wherein controlling the permeable member comprises controlling heating of the permeable member.

13. (Currently amended) Apparatus for leak detection comprising:  
a first sealable chamber configured to receive a test piece containing a trace gas;  
a second sealable chamber;  
a first valve coupled between the first and second chambers;  
a first leak detector including a test port and a vacuum pump;  
a second valve coupled between the second chamber and the test port of the first leak

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detector;

a second leak detector having a test port, the second leak detector comprising an ion pump; and

a trace gas permeable member coupled between the second chamber and the test port of the second leak detector, the trace gas permeable member allowing the trace gas to pass and blocking other gases, liquids and particles; and

a controller to control the permeable member at a high trace gas permeability at relatively high pressures a first pressure of about 100 millibar in the second chamber and to control the permeable member at a low trace gas permeability at a second pressure by relatively low pressures in the second chamber, which is lower than said first pressure and is suitable for operation of said leak detector.

14. (Previously presented) Apparatus as defined in claim 13, wherein the second valve is closed at relatively high pressures in the second chamber and wherein said second valve is open at relatively low pressures in the second chamber.

15. (Previously presented) Apparatus as defined in claim 13, wherein the permeable member comprises a quartz member, the apparatus further comprising a heating element in thermal contact with the quartz member, wherein the controller is configured to control the heating element.

16. Canceled.

17. (Previously presented) Apparatus as defined in claim 13, wherein the permeable member is permeable to helium.